

Citation:

Thumma J, Aiello AE, Foxman B. The association between handwashing practices and illness symptoms among college students living in a university dormitory. *Am J Infect Control*. 2009 Feb; 37 (1): 70-72. Epub 2008 Oct 3.

PubMed ID: [18834732](#)

Study Design:

Cross-sectional study

Class:

D - [Click here](#) for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

- The purpose was to evaluate handwashing practices of college students and the association with upper respiratory and gastrointestinal symptoms
- Researchers also studied the effects of gender on handwashing practices.

Inclusion Criteria:

- Participants were enrolled in a group *B Streptococcus* study (not described)
- Male and female college students living in a single first-year dormitory at the University of Michigan during January and February 2001
- Informed consent.

Exclusion Criteria:

None specifically mentioned.

Description of Study Protocol:

- *Recruitment:* Students living in a single first-year dormitory at the University of Michigan, Ann Arbor during January and February 2001 were invited to participate through a flyer placed in dormitory mailboxes
- *Design:* Cross-sectional study. Participants were sampled by dorm floor.
- *Blinding used:* Not applicable
- *Intervention:* Not applicable.

Statistical Analysis

- Descriptive statistics and chi-square tests were used to assess frequency of categorical

variables (gender, age, race and ethnicity, antibiotic use and different handwashing practices) and differences in the proportions of participants reporting handwashing practices by gender

- Cochran-Armitage trend test was used to determine the associations of handwashing practices
- Logistic regression was used to identify associations between self-reported illness and handwashing practices (generalized linear mixed models to adjust for cluster sampling and control for confounding variables).

Data Collection Summary:

Timing of Measurements

Participants were asked to complete a one-time self-administered questionnaire after signing consent.

Dependent Variables

- Handwashing frequency (no more than three times per day, 3.1-5.9 times per day, at least six times per day)
- Handwashing before eating (never or rarely, frequently, always)
- Handwashing after urination (never or rarely, frequently, always)
- Handwashing after bowel movement (never or rarely, frequently, always)
- Good handwasher ('no' or 'yes,' based on report of "frequently or always" before eating and "always" after urinating and bowel movement).

Independent Variables

- Gender (male or female)
- Illness (self-report).

Control Variables

- Use of antibacterial handwashing lotion
- Recent sexual activity
- Antibiotic use.

Description of Actual Data Sample:

Initial N

- 463 (217 males, 246 females) enrolled
- 458 (215 males, 243 females) reported handwashing practices.

Attrition (Final N)

As above.

Age

"Most" (no further details) were 18 or 19 years old.

Ethnicity

87% Caucasian.

Other Relevant Demographics

Not described.

Anthropometrics

Not described.

Location

University of Michigan, Ann Arbor.

Summary of Results:

Key Findings

- More females than males washed their hands at least six times per day (36% vs. 19%, $P<0.0001$)
- There were no significant differences among genders for handwashing before eating ($P=0.40$)
- Small proportions of males (10%) and females (7%) reported "always" washing hands before eating
- More females than males washed their hands after urinating (69% vs. 43%, $P<0.0001$) but not after a bowel movement (84% vs. 78%; $P=0.14$)
- No significant associations were found between handwashing frequency and gastrointestinal, upper respiratory, urinary or vaginal symptoms
- No significant associations were found between selected general illness symptoms and good handwashing practices in both unadjusted analyses and analyses adjusted for gender, antibiotic use, antibiotic hand lotion and recent sexual activity
- No significant associations were found between antibacterial hand soap or antibacterial hand lotion use and illness symptoms
- Good handwashers and others reported the same frequency of doctor visits (12% vs. 13%; $P=0.70$)

Other Findings

- Because antibacterial hand soap was the only type available in the dormitory bathrooms, about 87% reported using it. Students reported using antibacterial hand lotion (56%)
- Females were more likely than males to frequently or always use antibacterial hand soap (84% vs. 75%; $P<0.06$) and antibacterial lotion (25% vs. 12%; $P<0.0001$).

Author Conclusion:

- There was no association between selected illness symptoms and good handwashing practices, although trends suggest some reduction in selected upper respiratory infection symptoms
- Consistent with other observational studies of handwashing practices, females were more likely to wash their hands at critical points and to wash their hands more frequently than males
- Less than half the students frequently or always washed their hands before eating
- Identifying new strategies to increase handwashing may help prevent infectious disease

transmission in residence hall environments.

Reviewer Comments:

Weaknesses

- *Self-reported illness and handwashing practices (may be biased)*
- *Response rate (63%)*
- *No information on frequency of showering and cleanliness of the immediate living environment*
- *No information on validity of self-administered questionnaire*
- *Author conclusions of preventing infectious disease transmission is not supported by the data in this study (no significant differences between handwashing practices and illnesses).*

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	Yes
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	Yes

Validity Questions

1.	Was the research question clearly stated?	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	Was the selection of study subjects/patients free from bias?	No
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes

2.3.	Were health, demographics, and other characteristics of subjects described?	No
2.4.	Were the subjects/patients a representative sample of the relevant population?	No
3.	Were study groups comparable?	???
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	Yes
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	No
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	N/A
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	No
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	Was method of handling withdrawals described?	Yes
4.1.	Were follow-up methods described and the same for all groups?	N/A
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	Yes
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	Was blinding used to prevent introduction of bias?	No
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	No

5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	Yes
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were intervening factors described?	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	N/A
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	Were outcomes clearly defined and the measurements valid and reliable?	No
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	N/A
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	No
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	No
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	Was the statistical analysis appropriate for the study design and type of outcome indicators?	No

8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	No
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	No
9.	Are conclusions supported by results with biases and limitations taken into consideration?	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	No
10.	Is bias due to study's funding or sponsorship unlikely?	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes

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